

Distributed Impact Detection System, Phase I

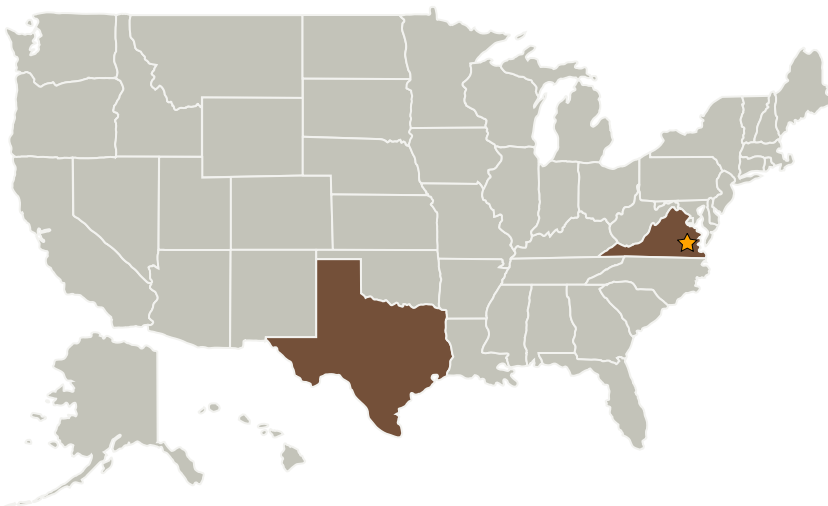
Completed Technology Project (2005 - 2005)



Project Introduction

Automated impact detection and characterization on manned spacecraft has been an elusive goal due to the transitory nature of the detectable high-frequency signals. The proposed approach for this effort is to use large numbers of self-powered, miniaturized, "stick on" piezoelectric sensory nodes that are synchronized within a radio frequency network. Each node will continuously monitor an accelerometer or acoustic emission sensor element for an impact event, such as the foam impact that caused the Columbia tragedy or an MMOD impact. When a programmable threshold is exceeded, a low-latency signal acquisition circuit will capture the event as a digital waveform for post-processing and impact characterization. In addition, autonomous collaboration and synchronization between nodes of the network will provide for accurate location determination through amplitude and time-of-arrival analysis. The innovative signal conditioning circuit design is capable of operation in the micro-watt range on average while constantly maintaining the capability to process and acquire very high-frequency acoustic signals. Such performance can provide operating lifetimes of 20+ years on a single AA battery, or unlimited operation from scavenged power sources such as solar or thermal gradients.

Primary U.S. Work Locations and Key Partners



Distributed Impact Detection System, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Distributed Impact Detection System, Phase I

Completed Technology Project (2005 - 2005)



Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Invocon, Inc.	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Conroe, Texas

Primary U.S. Work Locations

Texas	Virginia
-------	----------

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Mike Walcer

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.5 Structural Dynamics
 - └ TX12.5.3 Shock & Impact